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Aromatic High-Strength Fibers

H. H. YANG
Fibers Department
E. I. du Pont de Nemours & Co., Inc.
Richmond, Virginia



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Table II-25. Typical Properties of Kevlar Aramid Yarn*

Denier	1500
Number of filaments	1000
Specific gravity	1.44
Moisture regain (commercial) (%)	7.0
Stress-strain properties	
Straight tests on conditioned yarn	
Breaking strength (lb)	73.0
Breaking tenacity (gpd)	22.0
Elongation at break (%)	4.0
Initial modulus (gpd)	475
Loop tests on conditioned yarn	
Breaking strength (lb)	70.0
Breaking tenacity (gpd)	10.5
Elongation at break (%)	2.3
Thermal properties	
Strength loss (% after 48 h) in dry air at 350°F (180°C)	16
Shrinkage (%) in dry air at 320°F (160°C)	0.2
Zero-strength temperature, °F (°C)	850(455)
Half-strength temperature, °F (°C)	750(400)
Specific heat (cal/g °C at 25°C)	0.4
Thermal conductivity (Btu/hr/ft ² /°F/in. of thickness)	0.3

* From Du Pont (76).

and other tire yarns. Table II-28 compares the tensile properties of Kevlar 49 and several industrial filament yarns. Overall, Kevlar is an outstanding high-strength, high-modulus fiber. Its tenacity (strength per linear density unit) is greater than all conventional fibers. Its strength is relatively insensitive to temperatures up to T_g , and it is dimensionally stable. These features are discussed in the following sections.

7.3.1. Color

Most Kevlar fiber products have a bright yellow color. Some product types, for example, Kevlar 149, have a deep gold color.

7.3.2. Fiber Denier and Diameter

Most Kevlar fibers are 1.5 denier/filament (1.7 dtex). These fibers have a round cross-section and a nominal diameter of 0.012 mm. Fibers of 2250-denier Kevlar and 2130-denier Kevlar 49 yarns have a fineness of 2.25 denier (2.50 dtex) and 0.0147-mm nominal diameter.

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